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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of

Federal-State Joint Board on Universal Service — CC Docket No. 96-45

Forward-Looking Mechanism for High Cost Support for Non-Rural LECS — CC Docket No. 97-160

COMMENTS OF BELL ATLANTIC[1] ON III.C.2 PLATFORM

In the attached comments, Bell Atlantic provides its views and recommendations on the platform design for outside plant in a proxy model.

As these comments demonstrate, there are far more factors that influence the design and cost of outside plant than have been, or will be, incorporated in the Hatfield or BCPM proxy models. Since the cost of outside plant is the most significant difference between high cost and low cost areas, this defect in the models will result in unreliable estimates of the support needed for high cost areas. For this reason, the Commission

[1] The Bell Atlantic telephone companies ("Bell Atlantic") are Bell Atlantic-Delaware, Inc.; Bell Atlantic-Maryland, Inc.; Bell Atlantic-New Jersey, Inc.; Bell Atlantic-Pennsylvania, Inc.; Bell Atlantic-Virginia, Inc.; Bell Atlantic-Washington, DC, Inc.; Bell Atlantic-West Virginia, Inc.; New York Telephone Company; and New England Telephone and Telegraph Company.

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should use studies of actual forward-looking cost at the wire center level, rather than proxy models, to develop high cost support.

Respectfully submitted,

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III.C.2 Platform Design Components – Outside Plant Investment

a. Plant Mix (paras. 56, 58)

The Commission's tentative decision that a proxy model should include terrain and line density factors in determining the distribution of cable to aerial, buried, and underground installation fails to take into account many other factors that will determine the mix of outside plant. While a telephone company will seek to choose the plant mix that minimizes the cost of building and augmenting its network, cost is not the only consideration. Other factors, often overriding cost, come into play. For instance, many localities require utility companies serving new multi-dwelling living unit or new housing developments with as few as 5 homes to serve those homes with underground plant. This is required as a matter of aesthetics, not cost. Another issue that drives the plant mix decision is the number of cables that are anticipated in a route. A pole line will generally support 3 cable strands. If the demand in a route is such that more than 3 strands would be required, sound engineering design would dictate that a conduit system be installed. Where telephone plant is not allowed to span highways or railroad lines by aerial facilities, the telephone company must "jack" the facilities underground.[2]

The plant mix also is engineered to minimize maintenance costs and service disruptions as well as to maximize public and employee safety by configuring the plant

[2] "Jacking" a cable refers to digging a send and receive pit spanning the obstruction and then using high powered impact machinery to drive a steel casing between the two pits. The cable is then placed in the steel casing, usually in an innerduct.

mix to minimize potential hazards. Protective measures can take many forms. For example, plant (i.e., cable , electronics enclosures, etc.) can be placed above ground in areas prone to flooding or below ground on curved roads where facilities are more likely to be struck by vehicles. Climate conditions can affect not only the plant mix utilized in a particular area, but the cost of installing and maintaining that plant. For example, many companies have a policy whereby only insulation displacement terminals are used in locations that are exposed to the elements. The use of these terminals has reduced trouble reports and improved service, thereby reducing maintenance expense. These improved results require increased upfront investment; insulation displacement terminals cost roughly twice what traditional lug terminals cost.

As the Commission noted, neither the Hatfield nor the BCPM model seeks to minimize total lifetime cost, including maintenance, of the outside plant mix.[3] Different types of cable have vastly different levels of maintenance expense associated with them (especially for copper plant), and these costs must be considered in making an efficient economic decision. Installing higher cost plant, instead of "standard" plant equipment, may increase the initial cost, but may pay off with reduced maintenance expenses in the future. The decision to invest in upgraded materials (such as insulation displacement terminals) is almost always a result of bad experiences with the "standard" equipment.

[3] ***See*** Federal-State Joint Board on Universal Service, Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, CC Docket Nos. 96-45, 97-160, Further Notice of Proposed Rulemaking, FCC 97-256 (rel. July 18, 1997) ("*FNPRM*") at para. 56.

In the end, a major measure of success for a model will be whether it has the logic within it to consider all of the variables inherent to the plant mix decision and whether the solution that it develops could actually be built in the real world given the constraints such as those described above. If that cannot be said, then the costs that the model generates cannot be relied upon. To date, the proxy models do not consider all of the variables that an outside plant engineer must consider in the plant mix decision and that could directly impact the cost of providing service.

b. Installation and Cable Costs (paras. 60-62, 65-67)

In order to accurately estimate installation and cable costs, a proper and complete network must first be identified. The Commission is correct in concluding that the cost of installing conduit should vary with terrain and density.[4] However, to date, the models are weak in identifying all of the terrain factors that will influence network design and installation costs.

For instance, one of the terrain factors that significantly impacts cost is the degree (or lack thereof) that aerial facilities can be run in a straight line. The presence of many curves increases cable length and structure costs.[5] The more subterranean obstacles there are, the greater the difficulty (and hence cost) of installing an underground conduit system. For example, if a city has a subway system and steam pipes, its conduit

[4] ***See*** *FNPRM* at para. 65.

[5] Aerial structure costs are increased by the additional requirement for stub poles and anchor and guying.

installation costs will be much greater than for a city that does not. In some cases, underground obstacles preclude the use of a precast manhole, and a manhole must be poured in place at a much greater cost. In other cases, an alternative route would be used to go around the obstacle, which would increase cost. The presence of these obstacles does not necessarily correlate to density. Also, as the number of ducts required in a conduit system increases (i.e., as more copper cable and less fiber cable is used), the trench needs to get bigger, and the cost of avoiding subterranean obstacles, including hand excavation and the costs of restoration, increases exponentially. Conduit cost calculations need to take the size of the trench into account. Given these considerations, it is unlikely that the Hatfield model's 9 zone density approach or BCPM's 7 zone density approach adequately captures the relevant variables that affect the cost of installing wire and cable facilities.

Another problem with the models is that installation costs for a particular facility are often looked at in isolation, without regard for the impact of the resulting design on the rest of the network. The 2,000 foot distance between pullboxes that the Hatfield model uses is a perfect example. The fiber/copper crossover point specified in Hatfield along with the design decisions incorporated within the model results in a very large percentage of copper loops. When copper is constructed underground, it needs to be placed and spliced at approximately 600 foot section lengths.[6] Hence, Hatfield's largely

[6] Some copper cable can be constructed in 1,000 foot section lengths in ideal conditions. Factors limiting section length include large cable diameters, curves or bends in the

copper design is incompatible with a 2,000 foot conduit section. Needless to say, it would be inefficient to build two separate conduit systems for copper and fiber in the same feeder route. A conduit system needs to be built to accommodate all the requirements of the feeder/distribution route that it serves.[7] In most cases, that equates to 600 foot or less sections between manholes (i.e., not pullboxes).[8] In order to properly design a conduit system, route requirements such as number and type of cable as well as the number and placement of subsidiary legs must be known first.

Once a proper and complete network design has been accomplished, the installation cost of the components should take density and terrain factors into account. The Hatfield approach of increasing its use of distribution cable by 20% to avoid burying cable in difficult soil conditions is both simplistic and unrealistic and should be rejected. Likewise, specifying factors to deal with terrain and density issues, as is done in the BCPM, is also problematic. When engineers are asked to provide cost differential factors to account for different degrees of slope, they are often at a loss as to how to go about answering that kind of data request. As a result, the proxy model default values are often accepted. Engineers are better equipped to answer questions on the difference in cost of

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conduit, and a high degree of subsidiary duct locations to serve laterals and buildings. The presence of one or more of these factors necessitates shorter conduit section lengths. Ideal conditions would most likely be found in some rural and suburban areas.

[7] Manhole spacing is also affected by the amount of subsidiary legs that each manhole serves. In urban areas, for example, the large number of buildings that are served via subsidiary conduit results in manholes being placed closer together than in less dense areas.

specific activities, such as placing a pole in hard rock as opposed to normal earth, or the cost effect of cable splices being 400 feet apart as opposed to 500 feet apart. If accurate costs are desired, it would be best to specifically identify the elements of plant design and installation that vary with terrain and density, and then to specify the costs associated with the variations in those elements. It would be inaccurate for a model to estimate the costs associated with all of the possible variations in terrain and density and assume that they apply to large geographic areas through simple mathematical formulae.

Terrain and density factors are considered in developing costs for actual forward-looking cost studies. As such, these studies should be relied on for calculating universal service costs rather than the results of a proxy model.

c. Drops (paras. 70-71, 74)

Costs for drop wire, the vast majority of which are usually due to the labor component, do not necessarily correlate to distance. The major determinant of the time required to place a drop wire (and hence the cost) is the number of attachment points between the distribution terminal and the subscriber. Each attachment point requires transporting a ladder to that location, climbing the pole, installing the necessary hardware and hanging the drop. Houses situated on large lots may require the placement of poles

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[8] Pullboxes are not large enough to accommodate the large number of splice cases that are required in a route that is served by copper and/or fiber and copper.

on the property to reach the customer.[9] The most accurate drop wire cost platform would estimate the number of attachment points required for the input distance and then use an estimated time required per attachment point multiplied by the installation labor rate to determine the drop wire labor component cost. Labor time estimates should include the time required to trim trees and to clear other obstructions that would adversely affect the drop's service life. Wire material costs, which are distance variable, should be added to the labor cost.

Drop wire cost estimates should also address situations that are common in urban areas. Specifically, service wire (a.k.a. bridle wire) is often run along the rear wall from a terminal on or in the customer's building (or an adjoining building) to the customer's premises. The costs of such loop arrangements vary considerably from the typical aerial drop or buried service wire situation.

The Hatfield Model and the BCPM both fail to take these cost-causative factors into account in the calculation of drop wire costs.

d. Structure Sharing (paras. 76-79).

A proxy model should not be based on the assumption that telecommunications carriers benefit very much from sharing. An incumbent local exchange carrier ("ILEC") will bear approximately 50% of the total pole investment (representing a 50-50 share with

[9] Regulations vary by state as to whether the company, the customer or some combination of both are responsible for the cost of poles placed on private property to provide an

the local power company), 100% of conduit investment, 100% of the cost for buried cable that is plowed in, and 100% of the cost of anchors and guys.

For conduit and poles, the ILEC may receive rental revenue. Rental revenue should not be used in a sharing calculation, as it is irrelevant to the ILEC's investment.[10] Rental revenue, which is determined by state-specific tariffs, usually does not cover costs. Therefore, it should be used as an offset to the maintenance expense associated with the investment.

There is some opportunity to share trench costs for buried cable that is not plowed in.[11] This depends, among other things, on the availability of cable TV companies in a particular area and the compatibility of telephone and electric company plant in the same trench. The most relevant issue in the feasibility of trench sharing is the timing of the placement. When a new residential subdivision is being built, all utilities often are required to be in place at the same time (i.e., development completion/occupancy) and

individual subscriber's service.

[10] An ILEC will not place poles or conduit in order to serve another carrier's request when it has no use for those facilities itself. Conduit is rented on a "as available" basis. Space on poles is similarly rented, but the ILEC will replace an inadequate pole or move cable facilities to accommodate requests made by qualified companies. In such cases, the company requesting the facility replacement/rearrangement is charged for that work.

[11] A representative of the Hatfield team made the comment at the 9/17/97 FCC Proxy Model Workshop that most trenching done in new residential subdivisions is performed by the developer at no cost to the telephone company. That is simply not true. Telephone companies bear the cost for trenching in new subdivisions. In areas where the customer desires buried plant and there are no plans or no requirement for the telephone company to use buried plant, the telephone company may provide the necessary wire to

sharing of trenches is usually achievable unless there are plant incompatibility issues. In other situations, such as the augmentation of capacity in an existing feeder route, other utilities are likely to have no need to place facilities at that time, and the telephone company will have to bear the entire cost of the trench itself.

This demonstrates the fallacy of the AT&T argument that regulatory changes will affect carrier's decisions to share structures in the future. Carriers place facilities when they are required to serve their customers. Different carriers place their facilities at different times because their customer demand for new or upgraded facilities often occurs at different times. To the extent that the demand for new facilities does coincide, companies will share if practical. This is the current practice, and regulatory changes in the future are not likely to change it, certainly not in the near-term.

e. Loop Design

(1) Fiber-Copper Cross-over Point (paras. 84-87)

In determining an appropriate fiber-copper crossover point, it is not sufficient to consider simply the relative costs of copper vs. fiber investment at different distances. The investment in associated structure, as well as on-going maintenance expenses, must also be considered. A single fiber optic cable can serve tens of thousands of subscribers, and a 4" PVC duct can accommodate 3 innerducts which will hold one cable each. In a

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the customer (or their builder) if they open a trench and grant the telephone company a maintenance easement. Policies in this area vary by state.

copper design, that single duct can only serve 4,200 or fewer subscribers.[12] Hence, the amount of conduit that needs to be built in a copper environment is substantially greater than in a fiber environment. This cost differential, along with fiber's reduced maintenance requirements relative to copper, needs to be considered in the fiber-copper cross-over economic decision.

The economic choice between fiber and copper should also take into account the fact that fiber optic electronic equipment is fungible. If a competitor wins customers served by an ILEC via fiber, the ILEC can easily unplug fiber electronic equipment and use it elsewhere. Copper, on the other hand, would be stranded. The economics of fiber/electronics is optimized when the digital line carrier ("DLC") is sized appropriately to meet demand. In a rural area, this could be done with a cabinet with as few as 24 lines, while a controlled environment vault ("CEV") or a Hut could be used in an urban/suburban area with 8,000 or more lines. In order for a proper economic decision to be made, all the DLC options available to a carrier must be considered.

(2) Loop Standards (paras. 88-89)

A loop standard should be established so that the model's loop architectures will be consistent with minimum performance requirements. The loop should be capable of providing voice-grade analog service in such a manner that other, more advanced,

[12] The maximum size copper cable that a 4" PVC duct can accommodate is usually 3,600 pairs (due to duct conditions). A more typical size of actual large capacity copper feeder

features associated with a voice-grade analog line (i.e., ISDN) could also be provisioned. This would be consistent with the definition of universal service, as well as with the objective that the loop design should not impede the development of advanced services.[13]

The Commission should not adopt a loop performance standard based on the requirements of the Rural Electrification Loan Restructuring Act (RELRA). RELRA mandates that new loops support 1 mbps service. This mandate only applies to rural carriers that receive RELRA financing, which excludes the vast majority of telephone access lines. Such a performance standard would inflate the costs of the network by requiring significantly greater loop investment than is necessary to provide voice-grade analog service.

(3) Digital Loop Carrier (paras. 90-91, 93)

The Commission should not adopt a model that assumes only two sizes of digital loop carrier ("DLC'), as do the Hatfield and BCPM models.[14] This would skew the model's analysis of the economic decision of how and where to deploy DLC. DLC comes in many size increments both below and above the 384 or 672 line levels used by the Hatfield and BCPM models as the choice between "small" and "large" DLC. Matching DLC capacity to demand optimizes its economics. Small capacity DLC units have applications in both rural and urban environments. In the rural setting, small

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cable is 2,700 to 3,000 pairs.

[13] ***See*** *FNPRM* at para. 86.

[14] ***See*** *id.* at para. 91.

capacity DLC can efficiently serve the existing demand. In an urban setting, it is often difficult or impossible to place a large DLC enclosure, and many areas consist of non-high rise type buildings that do not have enough demand to justify a large capacity DLC installation. In such circumstances, a small DLC unit installed in a basement or mounted on a rear wall can efficiently serve a building or a series of buildings on the same block. In urban and some suburban areas, where there is sufficient density and there are no severe constraints on the telephone company's ability to place large capacity DLC enclosures, it is often most economic to place a large capacity (i.e., 4,000 lines or greater) DLC enclosure. Next Generation Digital Loop Carrier ("NGDLC"), which is currently being deployed by many ILECs, is capable of serving as a hub to one or more small DLC enclosures via fiber cable extensions. The current telephone company placement practice for large DLC enclosures is to place the DLC enclosure at a location within a carrier serving area ("CSA") that maximizes the number of customers that can be served by the DLC. CSAs are designed so that the copper loops that extend from a DLC enclosure will be 800Ωs or less and will not require load coils or other repeater electronics.[15] To make proper conclusions about the economics of DLC, large capacity units must be considered.

The model platform should include the costs of the electronic equipment that is necessary in the central office to support DLC in the loop. It is not clear that these costs are included in the Hatfield model.

[15] Stated in terms of distance, a CSA guideline compliant design would include copper cable that is less than 9KF if 26 gauge cable is used and can be up to 12KF if coarser

f. Wireless Threshold (paras. 95-102)

A proxy model should include wireless technology as a least-cost alternative to wireline technology. This would be consistent with Section 254 of the Act and with the Commission's universal service goals. Rather than adopting an arbitrary cap on loop costs, the Commission should adopt a cross-over based on data concerning the actual per-line cost of providing wireless service in a given density zone.

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gauges are used.

CERTIFICATE OF SERVICE

I hereby certify that on this 24th day of September, 1997, a copy of the foregoing "Comments of Bell Atlantic on III.C.2 Platform" was served by first class U.S. mail, postage prepaid, on the parties listed on the attached service list.

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